



Orthodontics and Wind Instrument Performance

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Music Educators National Conference



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Orthodontics and Wind Instrument Performance

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PREFACE

Orthodontics and Wind Instrument Performance was written for teachers who work with wind players and for wind instrument performers exhibiting malocclusions that require dental or orthodontic attention. In addition, orthodontists and family dentists will find useful information in the book.

Most wind instrument teachers will have students with orthodontic appliances at some time during their teaching careers. Teachers will encounter these students at all musical levels from elementary grades through college. Occasionally, adult professional players will be found needing treatment. The authors have attempted to identify the purposes, goals, and results of various types of orthodontic treatment and to describe the physical and mental adjustments required by the student-patient-performer. An effort has been made to relate these factors both to general concepts and to specific situations to achieve the greatest possible application for those to whom this book is directed. It is hoped that this exchange of ideas will result in greatly increased understanding of both the inherent problems and the possibilities for more effective results and adjustment on the part of the performer.

Glenn R. Wiesner

CHAPTER 1

PURPOSES AND GOALS OF ORTHODONTIC TREATMENT

Modern orthodontics can improve the biting and chewing function of the teeth, straighten poorly aligned teeth, make a smile more attractive, and thereby promote better dental health throughout life as well as strengthen the patient's self-esteem. The term generally used to describe irregular or crooked teeth is "malocclusion."

There are many causes of misalignment of jaws and irregularity of the teeth. Heredity is a major causative factor. Jaw size and tooth size can be inherited independently from parents who may or may not have malocclusions themselves. As a result, teeth may be too large or too small for the size of the jaw, causing crowding or spacing (see Figure 1).

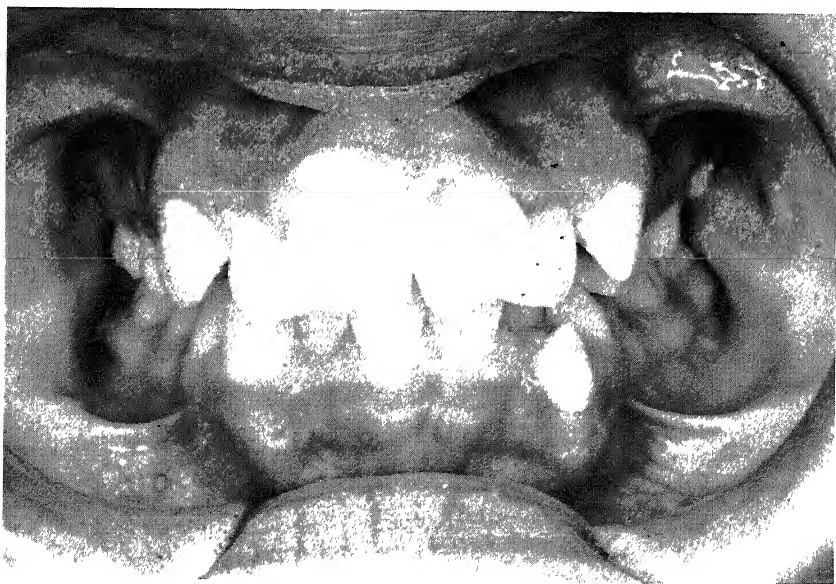


Figure 1

Early or late loss of baby teeth can produce alignment problems in the permanent dentition. Malocclusions also can be caused by such environmental factors as a thumb- or finger-sucking habit, or by abnormal swallowing, tongue, or lip habits (see Figure 2). If such a habit is a causative factor, then it must be corrected before treatment can be successful. Injury to the face or congenital malformation also can cause some orthodontic problems.

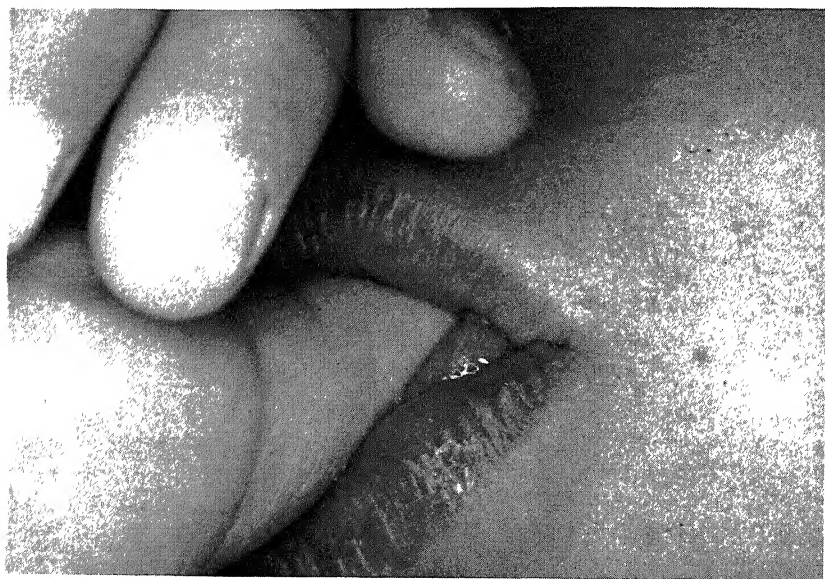


Figure 2

When an orthodontist evaluates a patient's problem, he must consider not only the alignment and functional relationships of the teeth, but he also must evaluate the patient's facial skeleton and neuromuscular apparatus (lips, tongue, swallowing pattern, cheek musculature, mouth-breathing) that surround the teeth and that have a very definite impact on the position of the teeth. A comprehensive evaluation of these three tissue systems (dental, skeletal, and neuromuscular) is a necessary and routine step in planning a treatment program. A visual check of the mouth, plaster models (see Figure 3), full face and profile photographs (see Figure 4), dental x-rays (see Figure 5), and head x-rays (see Figure 6), generally are used to diagnose the problem and to plan treatment procedures.

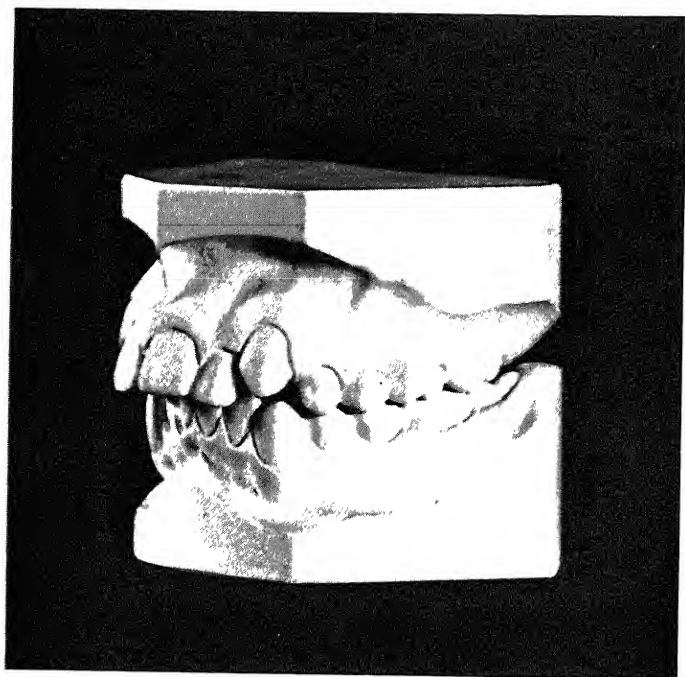


Figure 3

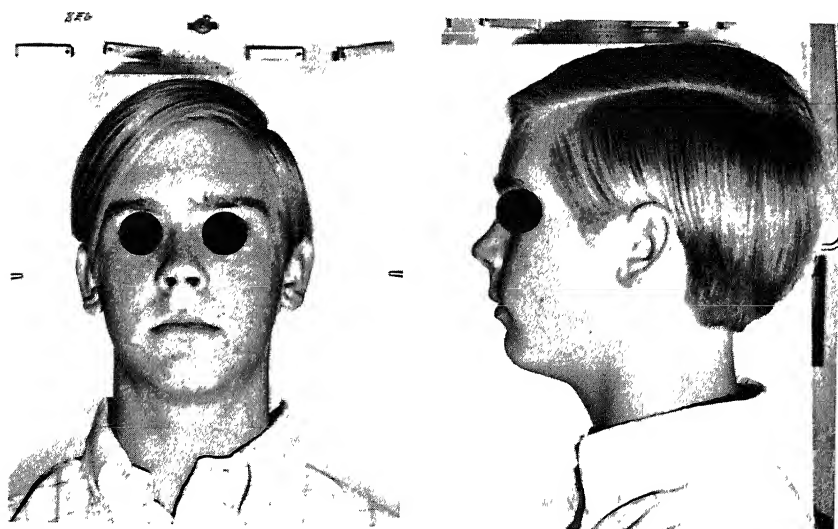


Figure 4

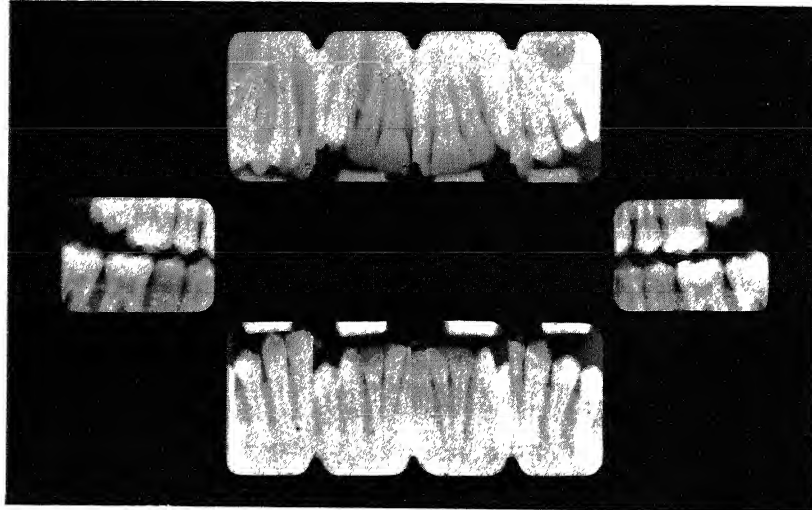


Figure 5

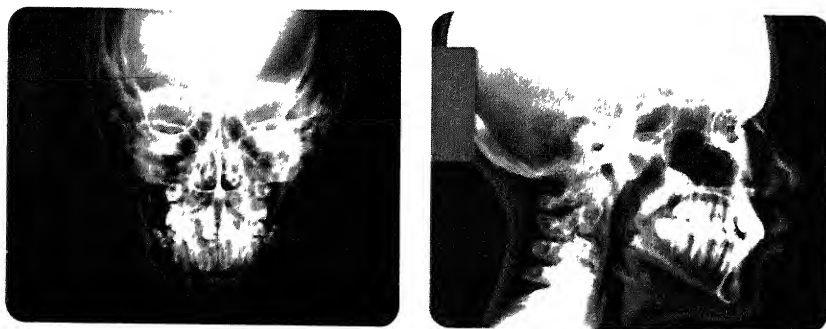


Figure 6

Classification of Malocclusions

Although no two malocclusions are exactly alike, the orthodontist commonly divides the problems into three broad categories. The first group of patients have reasonably well-balanced facial skeletons; however, the teeth show irregularities due to crowding, spacing, or tipping of the teeth into abnormal positions. Patients with this type of problem have a Class I malocclusion (see Figure 7).



Class I



Class II



Class III

Figure 7

A second group of patients may be identified by their convex profile. This type of profile may be due to a forward position of the upper jaw or a backward position of the lower jaw. The upper teeth protrude, and often the lip musculature must be strained to cover the teeth. Usually the lips are parted at rest and the procumbent teeth exposed. Individuals with this type of problem have a Class II malocclusion.

A third group of patients exhibit a reverse of the Class II type. Their profile is concave and the lower jaw and teeth are ahead of the upper

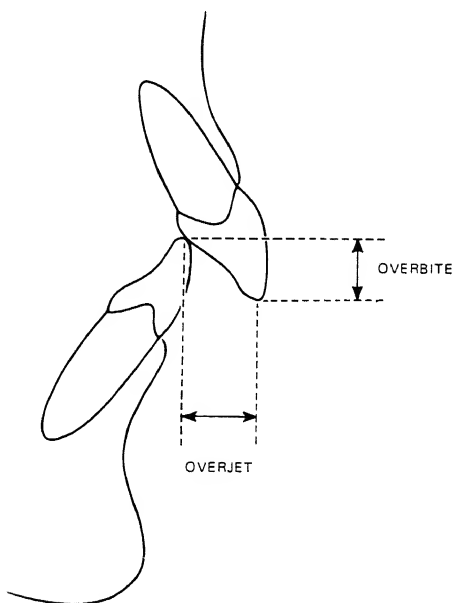


Figure 8

jaw. Individuals with this type of problem have a Class III malocclusion.

Other terms frequently are used when discussing specific malocclusions. Overjet describes the extent to which the upper incisors project horizontally forward and beyond the lower incisors (see Figure 8). The schoolyard term "buck teeth" can be described in the kinder and more correct term "an excessive overjet." Ideally the upper incisors should extend 2-3 mm. ahead of the lowers. When the lower incisors extend ahead of the upper incisors, the relationship commonly is described as a negative overjet and is characteristic of the Class III malocclusion. Overbite describes the extent to which the upper incisors overlap the lower incisors in a vertical direction. When the back teeth are in contact, only the upper to middle one-third of the lower incisors ideally should be covered. In some patients the overbite is such that the lower incisors impinge on the soft tissue of the palate behind the upper incisors. This relationship is functionally unhealthy (see Figure 9). The



Figure 9

opposite of the very deep, impinging overbite occurs when there is no vertical overlap of the front teeth. This relationship is called an open-bite and frequently is associated with a thumb or finger habit or with an abnormal tongue position (see Figure 10).

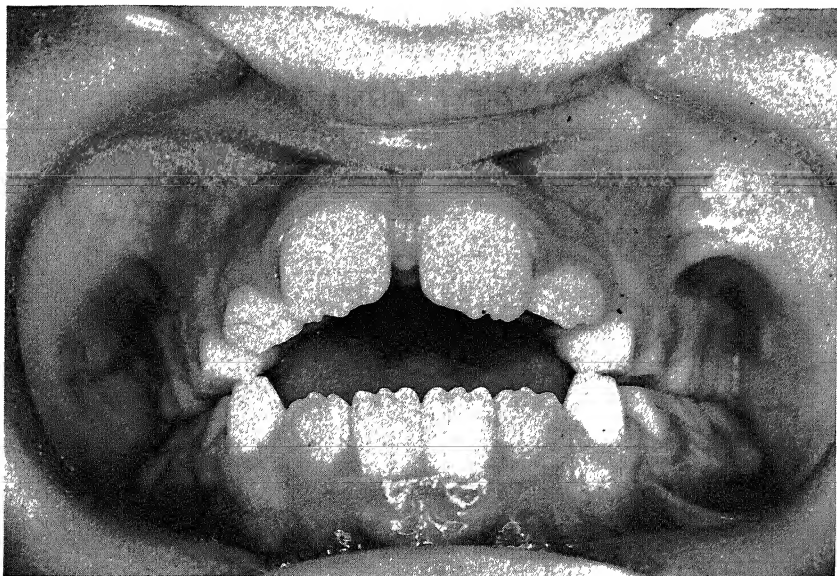


Figure 10

Orthodontic Appliances

An orthodontic treatment program begins with a clinical examination of the patient. Generally a child seven to nine years old is ready for an initial examination. Certain conditions should be treated earlier. Age alone is not the determining factor as both infants and senior citizens are orthodontic patients. After clinical evaluation of the problem, a decision is made either to initiate treatment or to wait for additional dental development to take place. If treatment is to begin, a detailed study of orthodontic records and a case analysis are made.

Orthodontic appliances then are fabricated and given to the patient. The term “appliance” is used in preference to “brace” since the latter implies a rigid immobile contrivance rather than a device that can be manipulated to tip, move bodily, and rotate the teeth within the surrounding bone.

A wide variety of orthodontic appliances may be used to correct the imbalances of the teeth and jaws. Appliances may be removable or fixed (cemented). Fixed appliances consist of individual bands that fit around each tooth and are cemented onto the tooth (see Figure 11). On the cheek or lip surface of the band is a bracket that may have a variety of configurations, depending upon the biomechanical system used by

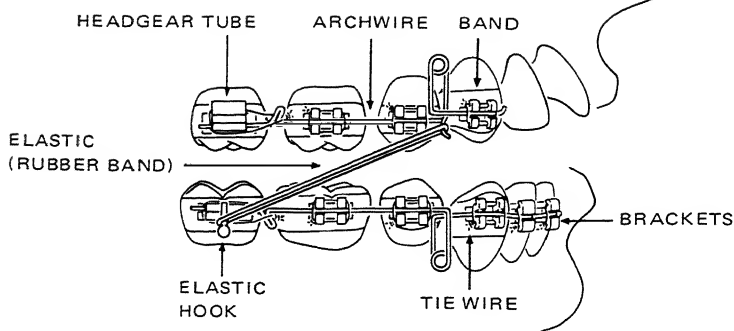


Figure 11

the orthodontist. The bracket-and-band is the means by which forces are applied to the teeth. Archwires, which may be round, square, or rectangular, extend around the dental arch and are attached to the teeth by means of the bracket. These archwires apply forces to the teeth to align them and also act as tracks along which the teeth are moved. Frequently a wire also is found resting on the inside (tongue side) of the teeth or across part of the palate (see Figure 12). This type of appliance is called a lingual wire and is used to move teeth by pushing on their inner surfaces. Small rubber bands or latex elastics often are seen running from a hook on one part of the appliance to another. These elastics are used to move teeth by pitting one group of teeth against another. The elastics usually are to be worn all of the time, although the length of time varies with the specific treatment objectives. The elastics are replaced by the patient daily or when they break. Often used in conjunction with the fixed appliance is a removable appliance called a headgear (see Figure 13). There are a variety of designs, but all use the head or neck as a point of resistance for forces that then are applied to the teeth and the jaws. This type of appliance is inserted and removed by the patient and is worn from eight to twenty-four hours a day as directed by the orthodontist.

The appliances described above, either alone or in combination, frequently are used for one and one-half to two years depending on the complexity of the case and the patient's cooperation. These appliances are used to establish good functional and aesthetic relationships among the teeth. While these appliances are in place, the patient usually is

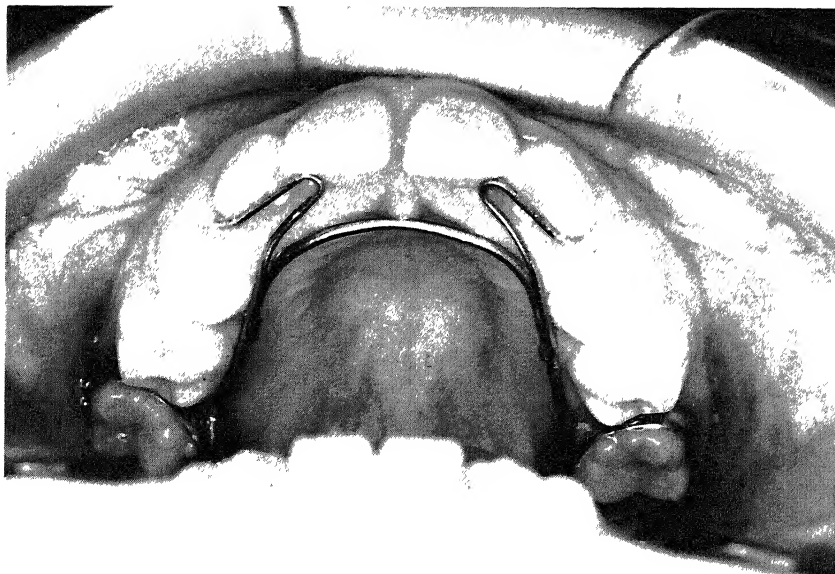


Figure 12

seen every three to six weeks. When the goals of treatment have been achieved, the fixed appliances are removed. The patient then is given retainers that allow further stabilization of the teeth, bone, and oral musculature (see Figure 14). The retainers usually are removable and are worn for varying amounts of time each day as determined by the orthodontist. Once the patient has become accustomed to the retainers, appointments may be scheduled every three to six months.

The capability of the appliances just described to move teeth within bone is due to the biological property of bone that causes it to resorb or dissolve under pressure and to deposit new bone under tension. The efficiency of these tooth movements depends on having the proper amount of force applied for a sufficient time over the proper distance. The most effective forces are relatively light and are applied in a nearly continuous manner.

Patient Adjustment

After appliances are inserted, the patient usually experiences some soreness of the teeth. The teeth feel bruised and are particularly tender when pressure is applied to them. Fortunately the soreness generally disappears after three to four days. During this initial period of ad-



Figure 13

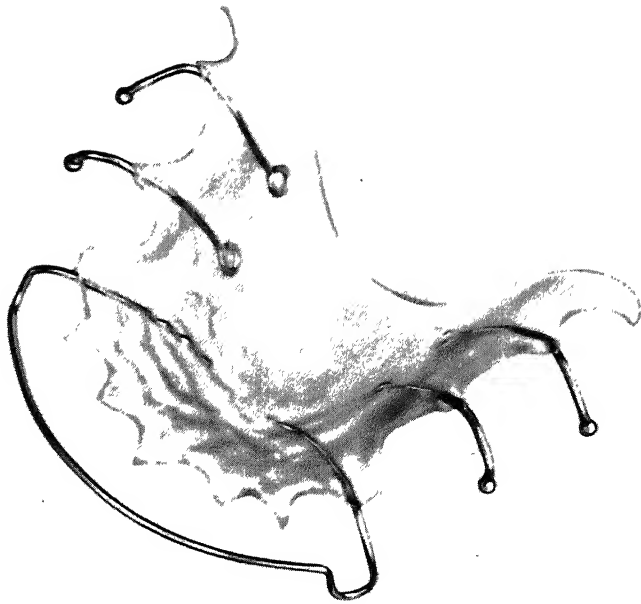


Figure 14

justment, the patient may want to avoid hard food and any activity that would place pressure on the teeth, such as playing a wind instrument. A similar type of soreness may be experienced during the course of treatment when major changes are made in the archwires. Usually only a few teeth are tender at this time, and the soreness is of shorter duration.

The shape and surface irregularities of the new bands and archwires also cause some irritation to the soft tissues of the lips, tongue, and cheeks. Fortunately this irritation is also temporary, for the mucous membranes and oral musculature rapidly adapt to the new shapes of appliances. These temporary discomforts are experienced to some degree by all orthodontic patients. The orthodontist undoubtedly will suggest steps to reduce this discomfort, but empathy and encouragement during this difficult period are most important.

Occasionally archwires break or bands become loose. Such problems can cause a pricking or scratching of the mucous membranes. This type of irritation is not normal and should not be ignored. The patient

should contact his orthodontist immediately for the appropriate adjustments.

Current Practices

Many orthodontists and music educators believe that certain wind instruments produce favorable forces upon protruding upper teeth while other instruments have an adverse effect. Instruments with a cup-shaped mouthpiece are thought to move teeth favorably and aid orthodontic treatment. Other instruments, particularly those with a single reed, are thought to place adverse forces on the teeth, thereby accentuating an excessive overjet and interfering significantly with orthodontic treatment. These conclusions are based on a clinical observation and mechanical analysis of the position of the instrument in relationship to the lips and teeth.¹ However, teeth move only when forces are of sufficient magnitude and duration. Therefore, accurate conclusions can be made only after an analysis of the magnitude of the forces generated by the instrument and embouchure and the duration of these forces.

Research and Recommendations

A recent study measured the magnitude of the perioral pressures using intraoral pressure transducers.² The findings of this study indicated a marked variation in the degree of pressure applied to the teeth of children playing the same instrument. The mean pressures exerted by thumb-sucking were greater than the mean instrument mouthpiece pressures. Brass instruments produced significantly greater lingually (backward) directed pressure against the incisors than any other instruments. Since the duration of pressure was not a factor in this study, there was no evidence that the pressures were of sufficient duration to move teeth.

¹Edward R. Strayer, "Musical Instruments as an Aid in the Treatment of Muscle Defects and Perversions," *Angle Orthodontist*, Vol. 9 (April 1939), pp. 18-27; A. Hruby and H. E. Kessler, "Dentistry and the Musical Wind Instrument," *Dental Radiography and Photography*, Vol. 32 (1959), pp. 1-8; Stephen Schultz, "Wind Instruments and the Dental Problem," *Wisconsin Dental Society*, Vol. 38 (September 1962), pp. 239-242; Robert H. Strang, *Textbook of Orthodontia* (Philadelphia, Pennsylvania: Lee and Febiger, third edition, 1950); S. Seidner, "Can Orthodontic Treatment Be Influenced by Wind Instruments?" *Journal of the Wisconsin Dental Society*, Vol. 40 (1964), pp. 261-263.

²Joseph A. Engleman, "Measurement of Periodical Pressures During Playing of Wind Instruments," *American Journal of Orthodontics*, Vol. 51 (November 1965), pp. 856-864.

An extensive study of all "proficient players" of brass and woodwind instruments in the Alameda, California, school system found that "the belief of some orthodontists that one instrument should be favored over the other in the hope that teeth will be influenced favorably is fallacious."³ Furthermore, the study indicated that "if the patient is under the proper supervision and using the correct embouchure, the orthodontist need not concern himself about a clarinet, flute, or saxophone player who may have Class II division 1 malocclusion [an excessive overjet]." It also was noted in this study that the common recommendation that an individual with a pronounced overjet play a member of the brass family can produce many frustrations and possibly failure. In order for such a student to play, he must thrust his jaws forward and yet maintain an opening between his teeth. This can be a difficult position for the student to maintain due to the fatigue of the external pterygoid muscles that are active in maintaining this position. There is evidence from the Alameda study that all brass and woodwind instruments may be helpful in developing muscle tone. The development of muscle tone is an extremely important facet of successful orthodontic treatment. Conditions often associated with protrusion of the front teeth are upper lips that are short and lazy (hypotonic) and lower lips that are rolled beneath the protruding upper incisors. Even after repositioning the teeth in an aesthetic and functional relationship, the lips may be hypotonic and insufficient (short) due to their past inactivity and poor position. Exercises to improve the muscle tone of the lips often are indicated. Wind instrument performance seems to contribute to muscle tone before, during, and after orthodontic treatment.

With these findings in mind, some basic factors should be considered when choosing a wind instrument and teaching a pupil who is undergoing orthodontic treatment. First, what would be the best instrument for the new pupil if no orthodontic treatment were done? The pupil's interest is obviously a major factor, but the comfort or discomfort of the embouchure and jaw musculature while playing a particular instrument also should be considered.

Second, the teacher must determine whether the recommendation would be different if the teeth were treated orthodontically and moved into an ideal functional and aesthetic relationship. Possibly the recommendation would be the same; however, in some cases one might be inclined to recommend another instrument. For example, a pupil who has severely irregular and rotated upper incisors might express an interest in playing the horn. The teacher may feel that the pressures exerted by

³John H. Parker, "The Alameda Instrumental Study," *American Journal of Orthodontics*, Vol. 43 (June 1957), pp. 399-415.

the edges of the rotated teeth against the lips would be a source of continual irritation, and might first recommend a flute. However, if orthodontic treatment is planned, then temporary measures could be taken to alleviate the irritation until treatment has been completed and ideal alignment established.

Third, if orthodontic treatment begins after the pupil has begun his musical training, it is most important that the teacher recognize that the embouchure will be affected temporarily by the thickness of the orthodontic appliances and by the materials used to alleviate the irritation. Adaption should occur in two to four weeks, with a return to pretreatment levels of performance. There also will be some soreness of the teeth initially and periodically that will affect the pupil's ability to play for two or three days. Empathy and encouragement from the teacher are needed during these periods. If adjustment does not take place, consultation with the orthodontist may result in additional corrections.

Fourth, if the pupil has orthodontic appliances in place before beginning his instrument, then some of the frustrations associated with a temporary drop in quality are avoided. However, the periodic soreness of the teeth still will cause temporary interruption in musical quality. When major musical events are planned, the patient should alert the orthodontist. Major appliance changes and their associated temporary discomfort often can be scheduled to avoid interfering with these important events.

The choice of a musical instrument, then, based solely upon the configuration of the teeth and upon the theorized impact of the instrument upon these teeth does not seem to be supported by recent research. Factors other than the type of malocclusion should be of equal or greater importance in the selection of a wind instrument. However, divergent opinions do exist within the orthodontic profession. Communication between the music teacher, patient, parents, and orthodontist therefore is most important.

CHAPTER 2

PHYSICAL ADJUSTMENTS TO WIND INSTRUMENTS

Several people usually are involved in the preliminary decision to seek orthodontic help: the musician-student who has the malocclusion, the student's parents, his teacher, his dentist. At first, the grade school student, sometimes with his parents, may approach the instrumental music director asking if he can start playing a wind instrument. It then becomes the director's job to determine what instrument the student should play. Many factors enter here, such as the owning of an instrument by the family, individual interest of the student, embouchure characteristics, and physical size of the student. However, prior to an instrument decision, the band director or other music teacher also should consider the student's teeth for shape, sharpness, angulation, and relationship of upper teeth to lower teeth. These dental characteristics should be correlated with the comfort of various wind instruments. At this point, careful observation must be made to fit the student to the right instrument. If it appears that there is a malocclusion, the teacher should suggest a visit to the dentist to confirm the existence of a problem and to make a recommendation for corrective measures.

Also vital is communication between the teacher and orthodontist. The extent of this dialogue will depend both on the knowledge and interest of the teacher and on the stage of development the student has exhibited on his instrument. Obviously, a different kind of understanding and solution will be needed if the patient has not yet begun an instrument. Even if he is well along on his instrument, a change may be recommended. It is important for the teacher, student, and orthodontist to be aware of the total situation, and not only his own involvement.

Mouthpiece Pressure

Physical adjustment to mouthpiece pressure with the appliances inserted is related to the wind instrument type, as well as to the type of

malocclusion and appliance. The problem is more acute when, for example, frontal protrusion is coupled with the cup-shaped mouthpiece of a brasswind instrument. Given a specific backward pressure from the cup mouthpiece to the lips (pressing, therefore, against the appliances), a trumpet or horn mouthpiece with its smaller contact area exerts more pressure per square inch than a larger cup instrument such as the trombone, baritone, or tuba. Therefore, while pain threshold may vary from person to person, the smaller mouthpiece generally tends to create more discomfort than the larger one.

Some pressure from a cup mouthpiece is always necessary in order to contain the air generated while blowing. However, since many brass players use excessive pressure, a reduction not only may be possible, but also will result in less discomfort. The patient normally realizes this quickly and immediately lessens the pressure. Improved breath support will help alleviate the need for excessive pressure.

The shape of the brass mouthpiece is an important variable. Some rims are rounded while others are more flat. The flatter rim probably will be more comfortable since the pressure is distributed over a slightly larger area of the lip. Although performance flexibility may vary according to the rim shape, the increased comfort may be worth the mouthpiece change.

The woodwind instrument player may be less affected by the addition of orthodontic appliances than the brass performer. Although there will be some slight pressure against the lips, and hence against the appliances and teeth, this is due primarily to embouchure pressure rather than pressure caused by pulling the instrument and mouthpiece against the lips. In single reed instruments this type of lip pressure is felt primarily against the lower lip, while embouchure pressure in double reeds is felt against both upper and lower lips. Types and amounts of pressure will depend, too, on the type of malocclusion, appliance, and playing angle of the reed instrument. It is fortunate that less pressure is used in woodwind performance, since less adjustment in pressure is possible while still retaining good embouchure control.

In all cases, the actual amount of mouthpiece pressure is very slight compared to the strong, constant, and planned pressure of the appliances. This is especially true of double reeds and flutes, but is also true of single reeds and brasswinds.

Thickness and Tonicity of Lips

Thickness and tonicity of the upper and lower lips and muscles in the immediate cushioning area will affect both comfort and physical adjustment. Normally the thicker the lips, the more cushion is provided.

Lip texture also has an effect, so that thick but very soft tissue may not yield any greater comfort than more average lip tissue. Brass players with heavier lips often use greater pressure to reach the upper harmonic partials available on the instrument; this tends to negate any theoretical comfort advantage for those performers.

The lips of wind players do change in tonicity with continued playing, so that the adult professional's lips may not be even throughout the red outer surface. At the points of mouthpiece or reed contact, the tissue may become very firm, almost calloused. Wind instrument players with firmly textured lips should be more comfortable in performance than other orthodontic patient-performers. Still, the most important consideration is how it feels to the player. Since pain threshold varies with the individual, it is his perception of discomfort that must be dealt with as much as any theoretical relationship between instrument and physical make-up.

Oral Cavity Changes

Early in his playing experience, the wind instrument player establishes a pattern of tongue placement. Thereafter, any change in the available oral space will force an adjustment of tongue placement and movement. When appliances are added, the amount of room left for movement of the tongue seems very greatly reduced, especially for brass players and flutists. This change in tonguing will continue as the teeth are moved into new positions. Any change in the oral cavity, no matter how small, seems very great to the patient. Even though much of this new feeling is due to the perspective of the patient, there is still somewhat less room in which to move the tongue back and forth in attacking or tonguing the note. The player is forced to accomplish his tongued attacks in slightly less area than before. The reverse is true when the appliances are removed. The first week of adjustment for a change in oral space will be the most extensive, and adjustment should come quickly after that.

The physical effect of orthodontic appliances on the oral cavity and embouchure can be considerable, depending on the instrument involved. Instruments employing embouchures with lips pressed tightly to the teeth will be affected most, since more direct irritation will occur and the contours of the teeth will be more noticeable as they are changed. The tip of the tongue also may strike the inside portion of the teeth and appliances. The amount of contact will vary with tongue placement during the attack and will be less with reed instruments. Some contact is inevitable, possibly resulting in discomfort and soreness near the tip of the tongue. This is not a great problem if the student begins with short frequent practice sessions, especially during

the early adjustment period. The wind player then gradually should increase his practice sessions until total daily playing time returns to its previous duration.

Facial Muscles

The muscles that control the embouchure include groups of muscles that originate from various parts of the face. These facial muscles insert into the borders of the orbicularis oris muscle, which is the large oval muscle encompassing and including both the upper and lower lips. In conjunction with the facial muscles, the muscles that control jaw movement, as well as differences in the joints on either side of the jaw, also affect the functions of the embouchure.

The various facial muscles can be demonstrated in small groups by standing in front of a mirror and moving small parts of the face at a time. The delicate balance of all these muscle structures is interrupted by placement of an orthodontic appliance, since the appliance changes the contours of the hard structures over which the soft tissues lie. A new balance must be achieved, with accompanying changes of sensations within the facial muscles.

In the best embouchures, the facial muscles that radiate from the orbicularis oris are balanced in their contractions that pull the orbicularis over the teeth and jaws. Embouchure formation entails a general evenness of all the muscles so that none work more than others. This evenness prevents the collapse of a section of the orbicularis oris as it is manipulated to various degrees of tension. The muscles provide an isometric response to the velocity and volume of air needed to produce the necessary range and dynamics. Controlled relaxation is desirable, producing the smooth contour over the teeth and jaws and the flat chin that many teachers desire in their students. Any sort of orthodontic appliance that interrupts this muscular balance will require a corresponding adjustment in those muscles involved.

Breath Support

The introduction of an orthodontic appliance not only will change the embouchure, but also may cause breath support in the unwary student to suffer. The very large change of awareness in the embouchure is enough to change the student's patterns in playing to the extent that everything physically, and to a certain extent psychologically, becomes involved. Anytime there is an interruption in the normal events of playing a wind instrument, breathing may be affected. The interruption may be caused by fatigue, tension, fright, pain, lack of concentration, or

an automatic change of embouchure provided by placement of an orthodontic appliance. A wind instrument, however, is activated by air and enough quantity and velocity must be provided for the embouchure to have something to manipulate.

When a student receives his first extensive orthodontic appliances he will direct most attention to his embouchure. His lip feels very much different, and unless he has developed a good pattern of breathing, his breath support now may not be adequate. This is especially true with the small cup mouthpiece instruments, such as cornet, trumpet, and horn.

Importance of Steady and Consistent Practice

Steady practice and a consistent method of practice are important to the progress of the wind instrument student. The lips and other tone-producing areas must be given time to adjust to the change in feel, oral space available, and new requirements for tone production. Several factors here are important. For the brass player, there is a difference in tongue comfort. Depending on tongue placement during the attack or initiation of tone, the tip of the tongue may strike the appliances. This may cause some soreness at first. Steady practice and a consistent tonguing position shortly will result in decreased discomfort and finally relative comfort in tonguing. The tip of the tongue actually may build up a firmer tissue resiliency or a kind of callous at the point where it strikes the appliance (behind the upper teeth), thereby increasing tissue resistance to injury or pain. Steady practice times of consistent duration as well as a consistent method of tonguing will produce the quickest and greatest amount of adjustment. Knowing this will happen also may support good psychological adjustment.

If no protective appliance is used, all wind players, especially brass wind performers, must adjust the inside of the lips to contact with the appliances. While the woodwind player will experience some pain because of embouchure control tightness (pulling the lips back against the appliances), the brass player has the additional pressure of the mouthpiece against his lips, pressing them against the appliances even more. With practice, the wind player will build up a thickening of the mucous membrane on the inside portion of the lips where there is contact with the appliances. In the brass player, this will tend to be more pronounced on the upper lip.

Practicing should not be painful if done slowly and carefully at first never letting a day or a practice session go by. Duration of practice sessions must be increased gradually and steadily. The small thickening of the mucous membrane will not harm performance, but

will insulate the player from painful contact with the appliances. Careful practice will result in decreased mouthpiece pressure, which will be of immediate benefit. Steady and consistent practice also will yield important results for embouchure, tongue movement, and mouthpiece position. Careful practice will be important in maintaining correct embouchure rather than rushing to find a position or embouchure setting that may be comfortable but ineffective for performance. Position of the brass mouthpiece on the lips normally should not be allowed to change because of the appliance (unless an embouchure change is desirable anyway). Steady and consistent practice habits will greatly aid adjustment to this new oral environment. Adjustment to appliances can be very smooth if the correct procedure is used and good practice habits are established.

Choice of Instrument

While some orthodontists may suggest outright that the patient stop playing his wind instrument, the possibility nevertheless exists for adjustment to the appliances with either the same or a different wind instrument. A member of a different family of instruments also may be considered, such as a string instrument or percussion. However, one or both of these other families of instruments may not be available, and choice of instrument must be determined largely by player interest.

Comfort and ease of performance are more important than the natural force tendencies of specific instruments with certain types of malocclusions. This is true because the force and effect of the appliances on movement of teeth is many times greater than those of any particular instrument. Double reeds, saxophones, flutes, and larger brass instruments, while providing very little help or hindrance in the correction of any type of malocclusion, can be played with relatively good comfort and natural embouchure adaptation with a fairly wide variety of malocclusions.

Any choice of instrument must take into account not only embouchure comfort and interests of the patient-musician, but also other physical characteristics. A student with respiratory difficulties will have problems on most wind instruments. Smaller students may not be comfortable carrying tubas in marching band. The flute is not highly recommended for a person with a multiple-orifice lip opening. Change of size or type of mouthpiece, especially in brasses, might have a very real and immediate effect on comfort. Each case must be considered on its own merits. A considerable amount of discussion may occur among dentists or wind instrument teachers during the selection of an instrument for a specific orthodontic case. If the student already is not well

established on an instrument, a decision must be made. It is the authors' feeling that comfort is a prime factor.

One of the most discussed types of instrument-malocclusion combination is playing of the clarinet by a patient with a pronounced protrusion of the upper front teeth. If the patient already plays the clarinet, correct playing of that instrument will have little effect on his orthodontic treatment. If the student's teacher helps prevent him from using his instrument as a lever, the continuation of this instrument is in order.

Some people believe the pressures involved in playing the high brass instruments, especially cornet or trumpet, can aid in the treatment of noticeably protruding teeth. However, the actual duration and degree of pressures involved here are overestimated. To deliberately put a student on this type of instrument where there is little beneficial effect regarding tooth movement and where, depending on the circumstance, there may be little chance of real success in playing that instrument well, can be a waste of time for everyone involved. It must be remembered that comfort and ease of performance are more important than any minor force tendencies of specific instruments in combination with certain types of malocclusions.

CHAPTER 3

PROTECTIVE APPLIANCES

Playing comfort, maximum efficiency, and security in performance may be achieved by installation of temporary protective appliances. Orthodontists commonly prescribe the use of soft wax over the sharp corners and edges of some appliances. The use of these materials may be suggested for any patient with a comfort problem, not just those studying musical instruments. Appliances can be constructed out of flexible materials easily obtainable and used by most dentists in general practice. These appliances are comfortable and fast in their insertion and removal. Their consistency in size and shape promotes a consistent embouchure. A protective appliance must be constructed by the dentist or orthodontist to assure that the orthodontic appliance itself remains unaffected.

One of the most common problems in the effect of orthodontic appliances on embouchure involves the orthodontic brackets that transmit the force of wires to the teeth (see Figure 15). Although the brackets are slightly rounded on the corners, many performers experience a definite irritation of the mucous membranes or the inside lining of the lip. The

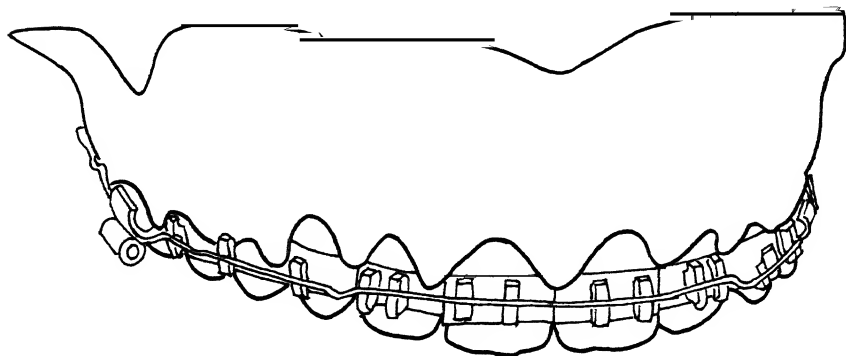


Figure 15

orthodontist may provide a soft wax that can be placed over the wires and brackets. However, this is time consuming in both its application and removal. In addition, the configuration is somewhat different each time it is applied, necessitating an adjustment of the embouchure. A protective device is needed that is easily applied as well as consistent in its function, and that does not interfere with the action of the orthodontic appliance. Flexible semipermanent materials, such as light body rubber-base impression materials or mouth-guard materials in sheet form, are relatively simple for the dentist to adapt into protective appliances. If a rubber-base impression material is used it should be of an aesthetic color, such as gray, white, or light yellow. An alginate impression material can be used to obtain an impression and the appliance then can be fabricated on the cast in the laboratory.

Construction of a Protective Appliance

With the patient in the chair:

1. Cut a 6 mm. strip of 28 gauge soft wax long enough to extend from left to right second bicuspid or longer if advisable to block out the molar areas.
2. Centering the wax over the labial wire, press firmly over the wire and brackets without perforating the wax at this time.
3. Using the fingers and a small pointed instrument, adapt the wax above and below the wire and brackets to eliminate undercuts (see Figure 16).



Figure 16

4. Press the wax down over the corners of the brackets with the pointed instrument so the corners are exposed. The orthodontic appliance now will have the appearance shown in Figure 17.

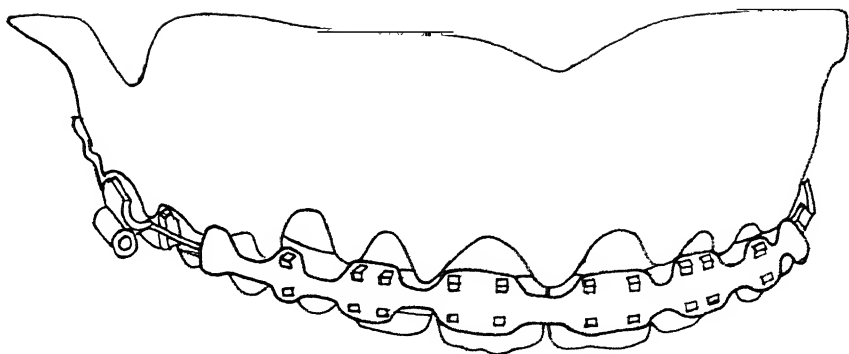


Figure 17

Fabrication in the Laboratory

Mouth-guard material, sheet form:

1. Select or form a piece of this material somewhat larger than is necessary to cover the area from the incisal edges to 3-4 mm. above the cervicals of the teeth and from cuspid to cuspid.
2. Heat and adapt the material to the wet cast, contouring until it is thin over the labial wire (see Figure 18). A piece of rubber dam material, lubricated thoroughly with silicone grease, can be used to adapt the hot mouth-guard material.

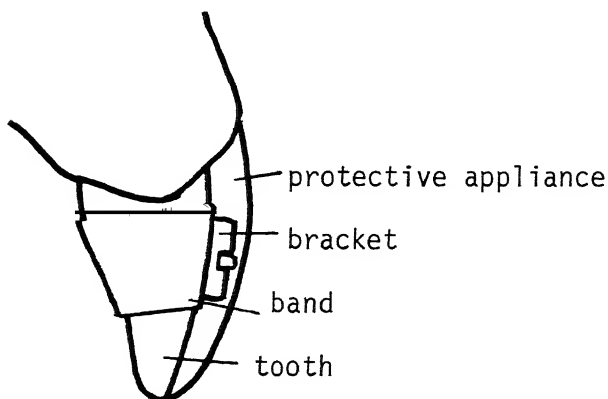


Figure 18

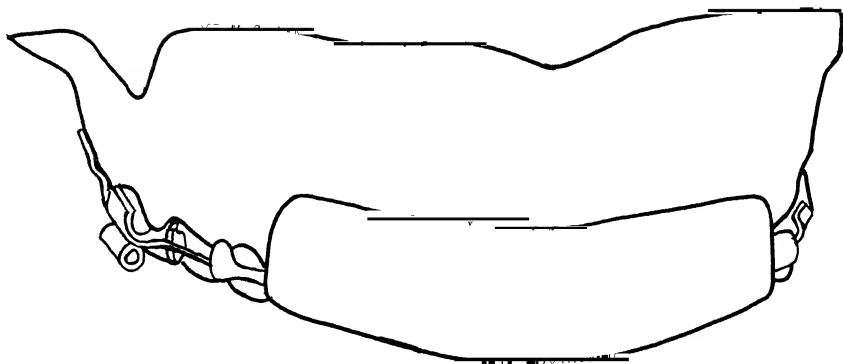


Figure 19

3. Flame the mouth-guard material until glossy, then cool.
4. Trim the borders into shape (see Figure 19).

Rubber-base impression material, light body:

1. Mix material in the usual manner.
2. Before the material starts to stiffen, apply to the wet model, covering a somewhat larger area than that included from the incisal edge to 3-4 mm. above the cervicals of the teeth and from cuspid to cuspid.
3. Tip the model into whatever positions necessary in order for the material to flow into the approximate shape as indicated in Figure 18. The spatula may be used to guide the material during the early moments of setting.
4. After setting, trim the border to shape indicated in Figure 19.

Protective Appliances for the Untreated Case

In cases where orthodontic treatment must await further development of the dentition, there may be pain to the mucous membranes or to the teeth when trying to play. Methods for alleviating irritation produced by the severe irregularity of teeth can be found after study of the individual case. One must not lose sight of the developmental aspects of any case, either while waiting for the optimum time to initiate treatment or when orthodontic appliances are in use. There also may be situations where orthodontic treatment will not be sought by a person with severe irregularity of the teeth. A different philosophy can be applied here, and hard materials may be used more frequently in constructing protective appliances for these cases. However, in the mixed dentition where

both primary and permanent teeth are present, a long range approach is still in order so that erupting permanent teeth do not make the use of a protective appliance relatively short lived.

Figure 20 shows a young saxophone player who had mixed dentition. Only the lower incisors had erupted. In fact they already had suffered from trauma because they were the only teeth in place and were susceptible to blows from athletic activities. These teeth not only cut

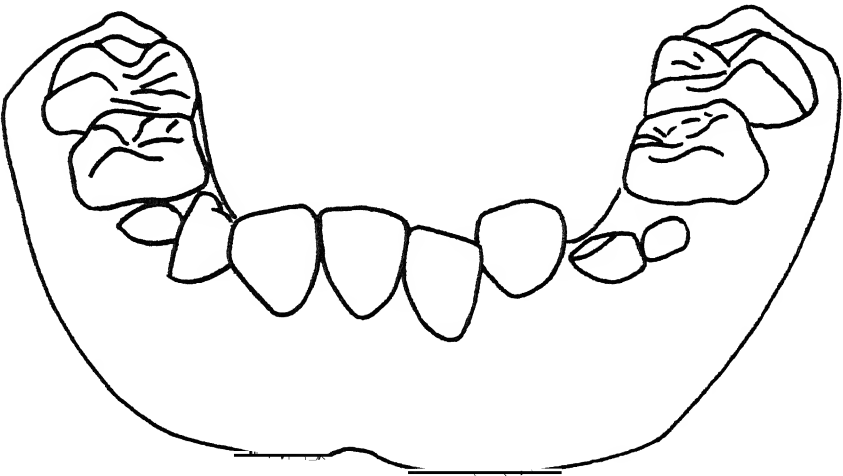


Figure 20

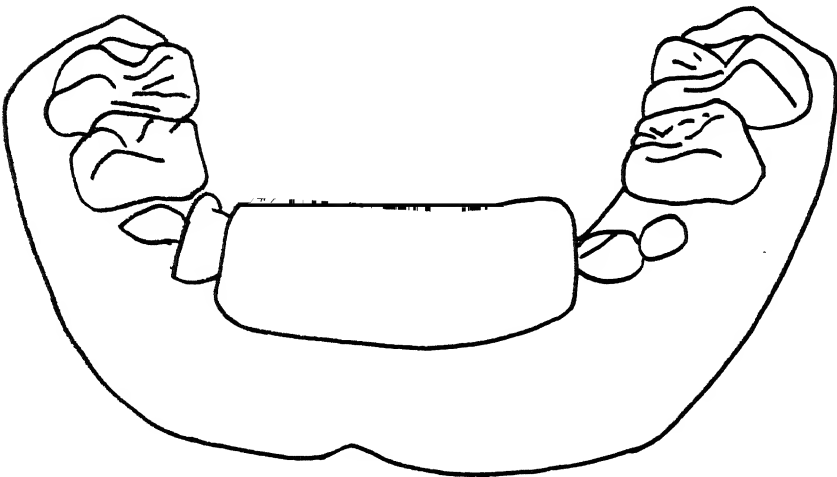


Figure 21

the inside of the lower lip but also hurt from the vibration of the saxophone reed because they were very sensitive. An appliance was made from mouth-guard material and adapted to the labial and incisal surfaces. The saxophone player readily and successfully adapted to the appliance (see Figure 21).

Other cases where orthodontics is indicated but not employed are demonstrated in Figures 22 through 25. These are common situations,

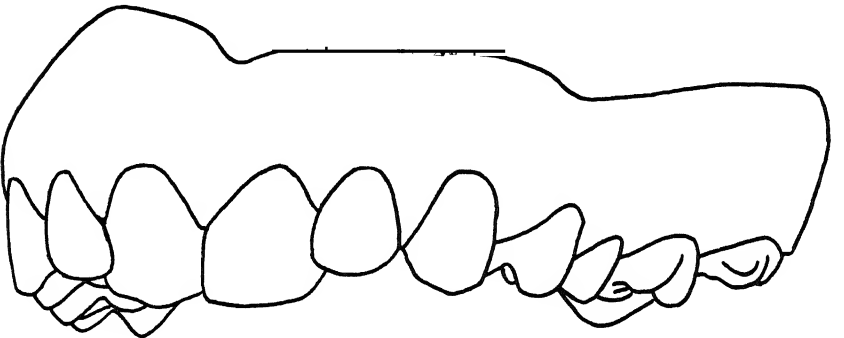


Figure 22

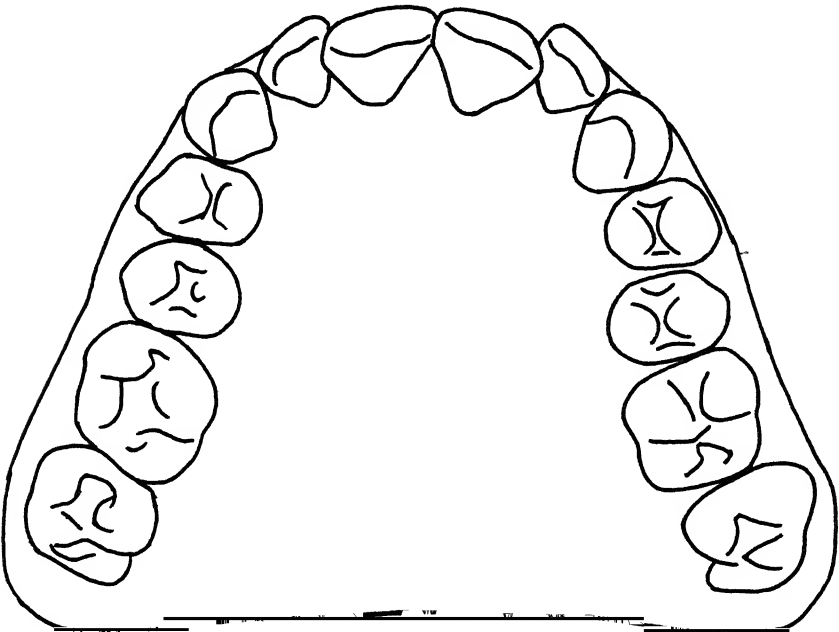


Figure 23

and judicious selective grinding may alleviate or prevent irritation to the mucous membranes. The smoothing of the offending incisal corners often can be done without either aesthetic or functional impairment.

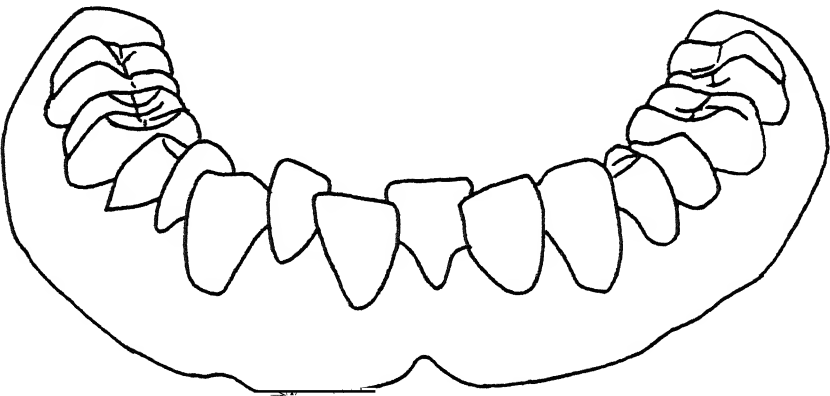


Figure 24

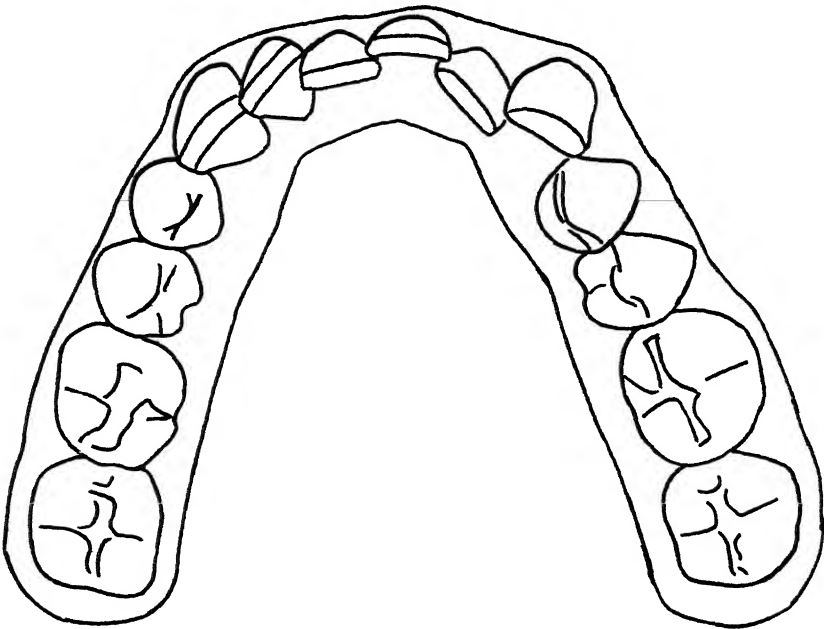


Figure 25

However, even when this is done with apparent success, the unsuspecting instrumentalist might some day notice considerable irritation to the mucous membranes after long hours of playing.

If there is irritation on the inside of the lips, something often can be done for immediate relief with an appliance that will not change the embouchure noticeably in most cases. This is an appliance that the performer himself fabricates. Either pure tin foil or aluminum foil can be adapted closely to the teeth with the fingers. It should extend slightly below the cervical (gum line) of the teeth and from cuspid to cuspid (canine) or slightly less. The foil is so thin that it will not interfere with the embouchure, and it has the effect of joining the incisal edges of the teeth into one continuous line and eliminating the separate incisal corners. After a piece of foil has been adapted to the teeth it can be placed in a small container to preserve its shape and used many times. As a precaution, several pieces of foil may be adapted ahead of time and stacked in a small storage container.

More severe cases involving protruding corners of teeth may require a thicker appliance to fill in the space between corners. These appliances also can be fabricated from rubber-base or mouth-guard materials, or they can be made out of hard materials such as dental acrylic or castings of dental gold. The gold casting might be considered a permanent appliance because of its durability and would allow for a consistent embouchure.

Fatigue or tension also may hinder adequate breath control or breath support. There is so much emphasis on lip problems that the full relationship between embouchure and breath control often is overlooked. Too often problems of embouchure evolve and are accepted as unavoidable when in fact there may be a successful remedy. One of the biggest problems is the pressure of traditional conclusions concerning specific problems. A flexible attitude and sufficient interest will help to alleviate the problem. The teacher, performer, and dentist, with their combined wealth of technical skill, might provide answers contributing to the happiness and satisfaction of all concerned.

CHAPTER 4

RETAINERS

The use of retainers, either permanent or removable, is extremely important in preserving new dental relationships and facial appearance. In order to receive the greatest possible benefit from the use of retainers, they should be used as directed by the orthodontist. The length of time that the appliances took to move the teeth into their new alignment is exceedingly short compared to the years the teeth took to arrive at their original position. For this reason the teeth in their new position are relatively mobile without the retainers; they will tend to return to their original position without some means of inhibiting regression. The orthodontist will provide retainers to prevent this from happening, but his prescription for use of these retainers must be followed completely.

It is nearly impossible to play a wind instrument with some form of the retainers inserted. This is true because of the abrupt decrease in the amount of space left in the mouth for a proper oral cavity and use of the tongue in articulation. The patient and his doctor must try to work out a sensible solution for performance and practice time without the retainers. One important factor is that the teeth are now more susceptible to movement from external pressure, and can be moved more easily by simple pressure from the mouthpiece of the musical instrument. Thus, depending on the desired direction of movement of the teeth, long periods of playing without retainers may or may not be recommended. If the time given to playing the instrument is significantly long, the number of months that retainers must be worn may be greater than otherwise would be indicated. This small increase in duration for wearing the retainers may be an acceptably small price to pay for the earlier adjustment in performance without the retainers.

Adjustment to the lack of appliances also is required but is much less a problem than is adaptation to the appliances or to the retainers. The patient generally will lose any scar tissue on the inside of the lips. He will feel as though he has much more room in his mouth, although the actual change in space will be small.

CHAPTER 5

PSYCHOLOGICAL ADJUSTMENT

During the adjustment periods, it is extremely important that the patient's wind instrument teacher be particularly observant of how the student reacts to the stress of the appliances, retainers, and the entire process of orthodontic treatment. By keeping the process and the doctor in mind, the teacher should be able to discover bad habits very quickly and to correct them as they arise. The teacher needs to be aware of the processes and sequence of treatment that the student is undergoing. Only in this way can he determine the probability of a problem; too much mouthpiece pressure, a change in tongue placement, lip orifice changes, articulation difficulties, and so forth. As the patient's teeth change, so will his approach to his instrument; it must be the teacher's responsibility to see that these changes are correct and timely.

The student must be in a receptive frame of mind in order to anticipate problems and deal with them effectively. Both the student and the teacher must have a positive, constructive attitude. The situation must be faced squarely: a change is inevitable. The change can be dealt with and there is every reason why it should be handled logically and purposefully. If the student thinks he will never adjust to his appliances, he probably will continue to be frustrated. Practice times may become erratic or may be skipped entirely. Excessive brass mouthpiece pressure may result, and if the student is strong-willed, he may attempt to overcome the difficulties by an excessive amount of practice, thus creating additional problems. If he has a positive attitude, however, he will adjust and continue or commence with playing. Both the student and instructor should be aware of the probable duration of orthodontic treatment. The implications of the treatment for performance difficulties and frustration should be taken in stride. Assigning great importance to adjustment problems only will make them loom larger in the mind of the performer and make adjustment longer and more difficult.

It is important, therefore, that both teacher and student think of the whole process as just one more aspect of life to get used to, once the

decision has been made to continue or commence instruction. Many wind performers, including students, professionals, and amateurs, have gone through this somewhat frustrating period of orthodontic treatment and lived to tell of it. The way they have endured the experience depends to a great extent on factors mentioned earlier:

1. The decision to commence or continue performance.
2. Severity of malocclusion.
3. Type of appliance.
4. A positive and constructive perspective by the performer and teacher.
5. Size and type of mouthpiece.
6. Thickness and texture of lip tissue.
7. Embouchure—mouthpiece placement and comfort, changes with or without appliances, retainers.
8. Protective appliances.
9. Care and consistent use of retainers.
10. Psychological adjustment.

Consideration of and adjustment to each of these factors will determine largely the duration and success of orthodontic treatment and continued performance on the patient's wind instrument.